Exhibit R-2, RDT&E Budget Item Justification: PB 2017 Missile Defense Agency											Date: February 2016	
Appropriation/Budget Activity 0400: *Research, Development, Test & Evaluation, Defense-Wide* / BA 3: *Advanced Technology Development (ATD)*					R-1 Program Element (Number/Name) PE 0603178C / *Weapons Technology*							
COST ($ in Millions)	**Prior Years**	**FY 2015**	**FY 2016**	**FY 2017 Base**	**FY 2017 OCO**	**FY 2017 Total**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**	**Cost To Complete**	**Total Cost**
Total Program Element	45.268	61.396	51.153	71.843	-	71.843	69.004	53.745	66.400	67.487	Continuing	Continuing
MD69: *Directed Energy Research*	26.315	20.691	26.055	47.691	-	47.691	65.695	51.044	63.026	63.965	Continuing	Continuing
MD72: *Interceptor Technology*	18.953	40.000	22.967	22.000	-	22.000	0.000	0.000	0.000	0.000	Continuing	Continuing
MD40: *Program-Wide Support*	-	0.705	2.131	2.152	-	2.152	3.309	2.701	3.374	3.522	Continuing	Continuing
Program MDAP/MAIS Code: 362												

Note

The FY 2017 Directed Energy Research MD69 increase from FY 2016 to FY 2017 funds laser test bed power demonstrations, laser packaging demonstrations, and hundreds of kilowatt class scaling designs based on successful 44 kilowatt Fiber Combining Laser (FCL)and 13 kilowatt Diode Pumped Alkali Laser (DPAL) system demonstrations. The increase from FY 2017 to 2018 reflects additional diode purchases to scale the DPAL from the 30 kilowatts planned in FY 2016 to 120 kilowatts in FY 2018 and scale the fully packaged, flight qualifiable FCL from 30 kilowatts in FY 2017 to 50 kilowatts in FY 2019. The decrease from FY 2018 to FY 2019 reflects the downselect from two technologies to the single best technology for further development beginning in FY 2019.

A. Mission Description and Budget Item Justification

The Weapons Technology program element develops and tests a high-powered directed energy laser to build the foundation of the next-generation laser system on a high altitude airborne platform. This laser system will be capable of acquiring, tracking and destroying an enemy missile at a much lower cost per kill than is possible with the existing Ballistic Missile Defense System (BMDS). The MDA's laser development investment, incrementally develops scalable, efficient, and compact high energy laser technology in the laboratory before beginning a high power laser flight test program. The technology required for tracking the target, aiming the laser, and building the flight demonstrator prototype is developed under the Technology Maturation Initiatives (TMI) program element (0604115C).

The MDA collaborates with the Office of the Assistant Secretary of Defense for Research and Engineering, the Defense Advanced Research Projects Agency (DARPA), the High Energy Laser Joint Technology Office, and the Air Force in a systems engineering based strategy to research, develop and test Directed Energy weapons technology. Within Directed Energy Research MD69 MDA conducts research into the transmission and control of directed energy largely above the atmosphere for mid-term missile defense applications and, ultimately, boost phase intercepts. The MDA is pursuing promising laser technology in a competitive environment with Industry, supported by breakthrough research at the Nation's premier laboratories. The MDA will focus on Directed Energy technology development with the goal of scaling to power levels required for robust, speed of light missile defense. The MDA is developing a set of common core technology that will enable both missile defense and air dominance missions. These core technologies include fiber launchers; high brightness, high efficiency diode pump modules; and high power, high efficiency fiber amplifiers. In FY 2017, the MDA, the DARPA and the Air Force will complete a 30 kilowatt packaged FCL system at the Massachusetts Institute of Technology Lincoln Laboratory. The system consists of the laser, batteries and thermal device. In FY 2018, The MDA will upgrade the 30 kilowatt packaged FCL to a 50 kilowatt class Fiber Combined Laser (FCL) for demonstration in FY 2019. In FY 2017, the MDA will upgrade a Diode Pumped Alkali Laser (DPAL) testbed at Lawrence Livermore National Laboratory to conduct a 30 kilowatt demonstration with improved beam quality. The MDA will also complete a design review for a 120 kilowatt DPAL system. This

effort is a prerequisite to conduct a 120 kilowatt laboratory demonstration in FY 2019, after which the MDA will evaluate the DPAL, FCL, and Industry laser systems to select the best approach to continue high power laser system development and fabrication. Each laser will demonstrate the technology necessary to scale the power to hundreds of kilowatts in order to enable the MDA path to boost phase intercept.

The Agency will make technology investments in Divert and Attitude Control System (DACS) for future BMD interceptors and kill vehicles.

MD40 Program-Wide Support (PWS) consists of essential non-headquarters management efforts providing integrated and efficient support to MDA functions and activities across the entire BMDS.

B. Program Change Summary ($ in Millions)	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total
Previous President's Budget	54.068	45.389	48.912	-	48.912
Current President's Budget	61.396	51.153	71.843	-	71.843
Total Adjustments	7.328	5.764	22.931	-	22.931
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	0.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	5.764			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	8.272	0.000			
• SBIR/STTR Transfer	-0.944	0.000			
• Other Adjustment	0.000	0.000	22.931	-	22.931

Change Summary Explanation

The FY 2015 increase provided an added collaborative laser lethality demonstration using the 150 kiloWatt-class Demonstrator Laser Weapons System, and additional funding to maintain diode production for both the Diode Pumped Alkali Laser and Fiber Combining Laser.

The FY 2016 and FY 2017 increase continues funding for Divert Attitude Control System.

Exhibit R-2A, RDT&E Project Justification: PB 2017 Missile Defense Agency			Date: February 2016
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603178C / *Weapons Technology*	Project (Number/Name) MD69 / *Directed Energy Research*	

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
MD69: *Directed Energy Research*	26.315	20.691	26.055	47.691	-	47.691	65.695	51.044	63.026	63.965	Continuing	Continuing

Note

The FY 2017 MD69, Directed Energy Research, increase from FY 2016 to FY 2017 funds increased laser test bed power demonstrations, laser packaging demonstrations, and hundreds of kilowatt class scaling designs based on a successful > 40 kilowatt Fiber Combining Laser and >10 kilowatt Diode Pumped Alkali Laser system demonstrations.

A. Mission Description and Budget Item Justification

The MDA mission is to develop a robust system to defend the United States against ballistic missile attacks at all ranges, in all phases of flight. Negating a ballistic missile in boost phase, before a threat missile can spawn countermeasures, will revolutionize missile defense by dramatically reducing the role of interceptors. In FY 2010, the Airborne Laser program proved we could acquire, track and destroy a boosting missile, addressing many aspects of the boost phase kill, but also underscored the complexity and challenges of fielding such a weapon system. The experience we gained from that successful first foray into directed energy system is pointing us along a new path that integrate a highly efficient, compact electric laser into a high altitude, low Mach Unmanned Aerial Vehicle capable of flying in the stratosphere above the clouds, which diffuse the laser energy. Flying at low speed in relatively calm air at 60,000 feet significantly reduces the complex beam pointing and atmospheric jitter compensation systems that were significant challenges on the Airborne Laser. The key to realizing this future high altitude, unmanned directed energy system is the laser.

With these lessons learned and breakthrough research at our nation's premier scientific laboratories, the MDA is implementing an incremental roadmap that will prove high power laser technology is ready to execute Missile Defense missions by 2022. This roadmap jointly develops with the Defense Advanced Research Projects Agency and the Air Force a set of core technologies common to both Air Force and missile defense missions; including fiber launchers; high brightness, high efficiency diode pump modules; and high power, high efficiency fiber amplifiers.

The Directed Energy Research project funds the laboratory development of two high energy laser technologies, the Diode Pumped Alkali Laser (DPAL) with Lawrence Livermore National Laboratory and a Fiber Combined Laser (FCL) with the Massachusetts Institute of Technology Lincoln Laboratory. Both laser technologies have considerable promise for scaling to very high average power while simultaneously achieving high system electrical-to-optical efficiencies, exceeding 40 percent, and very low system weight and volume. However, each technology takes a unique approach to attaining high power. The DPAL scales in power by increasing the size of a single laser gain cell. This approach has the benefit of simplicity of design but must address very high energy levels within the single cell. Livermore successfully demonstrated over 10 kilowatts in FY 2015; will demonstrate 30 kilowatts in FY 2017 and scale the system to 120 kilowatts in FY 2019 to address energy scaling. The FCL scales in power by combining multiple individual fiber amplifiers. MDA's key fiber laser investments are targeted at driving the weight per kilowatt of power in the fiber amplifier system down while increasing the individual fiber amplifier power output. MDA joined with the Defense Advanced Research Projects Agency and the Air Force to demonstrate 44 kilowatts in a room-sized, 40 kilogram per kilowatt configuration in FY 2015, to a packaged 7 kilograms per kilowatt 30 kilowatt system in FY 2017, and increase the compactness and power to a 5 kilogram per kilowatt 50 kilowatt system in FY 2018.

Exhibit R-2A, RDT&E Project Justification: PB 2017 Missile Defense Agency		Date: February 2016
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603178C / *Weapons Technology*	**Project (Number/Name)** MD69 / *Directed Energy Research*

The MDA strategy is to reduce technical risk through dual path laboratory development and transition the laboratory development to industry for high altitude unmanned platform integration and test. In FY 2018, the MDA will conduct multiple industry laser studies to investigate high power scaling and technology readiness. In FY 2019, the MDA will select the best available high energy laser technology from the National Laboratories and/or Industry and develop a prototype 300 kilowatt-class laser system by 2022.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Title: Directed Energy Research	20.691	26.055	47.691
Description: N/A			
FY 2015 Accomplishments: - Demonstrated greater than 10 kilowatt Diode Pumped Alkali Laser (DPAL) test bed performance with high efficiency and excellent gain medium thermal control -- Demonstrated DPAL operation with accumulated run time of greater than 100 minutes without degradation of any system components -- Completed design and procurement of a beam correction system for 30 kilowatt (kW) test bed -- Completed design and construction of a next-generation, high-flow alkali vapor circulator system for the 30 kW test bed - In conjunction with the Defense Advanced Research Projects Agency; -- Completed the engineering development unit for the next-generation Fiber Combined Laser (FCL) compact amplifier -- Upgraded the efficiency of the 42 element FCL laboratory system and demonstrated greater than 40kW average power output with near-ideal beam quality -- Completed Concept Design Review/System Readiness Review for the Low-Size Weight and Power (SWaP) FCL demonstration -- Demonstrated excellent beam quality with a 101-element low-power combining setup confirming scalability of FCLs -- Demonstrated a 2.5 kilowatt combinable fiber amplifier, a significant upgrade from the current 1 kilowatt amplifiers used today -- Completed testing of a next generation fiber launcher prototype - Analyzed and evaluated DPAL and FCL laboratory test data, as well as power and efficiency analysis for scaling to Ballistic Missile Defense System relevant power levels - Awarded five contracts with Industry to define concepts that could be used to develop and integrate a multi-kilowatt class laser into a high altitude airborne platform for multi-mission demonstrations			
FY 2016 Plans: Based on multiple successful Fiber Combined Laser (FCL) 40 kilowatt (kW) demonstrations and Diode Pumped Alkali Laser (DPAL) 10 kW demonstrations, the increase from FY 2015 to FY 2016 funds increased laser test bed power, laser packaging demonstrations, system robustness and megawatt-class scaling designs.			

Exhibit R-2A, RDT&E Project Justification: PB 2017 Missile Defense Agency		Date: February 2016
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603178C / *Weapons Technology*	**Project (Number/Name)** MD69 / *Directed Energy Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
- Upgrade the 10 kW DPAL laboratory demonstration system to a 30 kW-class test bed -- Conduct beam quality characterization testing to validate gain cell flow uniformity -- Validate gain cell waveguide scaling path to higher power operation -- Demonstrate improved robustness and reliability of pump diode modules -- Initiate design for a 120 kW DPAL gain cell and pump delivery system - In collaboration with the Defense Advanced Research Projects Agency and the Air Force, complete the critical design review and begin fabrication and integration of the 5 kilograms (kg) per kW low size weight and power Fiber Combined Laser (FCL) system -- Conduct FCL advanced beam combiner high power demonstration to verify the combiner can scale to required performance levels -- Analyze and evaluate laboratory and industry high energy laser test data for scaling to ballistic missile defense system relevant power levels - Implement directed energy models and simulations to assess technology capability against expected threats, define technology gaps and identify and mitigate technical risks -- In conjunction with the High Energy Laser Joint Technology Office (HEL JTO) address real-time laser deconfliction procedures and implementation mechanisms			
FY 2017 Plans: The increase from FY 2016 to FY 2017 funds increased laser test bed power demonstrations, laser packaging demonstrations, and hundreds of kilowatt (kW) class scaling designs based on successful > 40 kW Fiber Combined Laser (FCL) and > 30 kW Diode Pumped Alkali Laser (DPAL) system demonstrations - Demonstrate a 30 kW operation with 30% electrical-to-optical (E-O) efficiency - Upgrade the 30 kW DPAL system laboratory test bed -- Demonstrate a 30 kW DPAL beam with the ability to tightly focus on the target (beam quality at 1.5X diffraction-limited) --- Complete characterization of a deformable mirror beam correction system --- Design, fabricate and install a beam formatting and transport subsystem -- Complete a preliminary design for a 120 kW DPAL system -- Integrate a 10x12 diode array unit cell backplane - In collaboration with the Defense Advanced Research Projects Agency and the Air Force; upgrade the FCL system -- Deliver and demonstrate a flight qualified 1kg per kW compact fiber amplifier traceable to Ballistic Missile Defense System high energy laser system requirements			

Exhibit R-2A, RDT&E Project Justification: PB 2017 Missile Defense Agency		Date: February 2016
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603178C / *Weapons Technology*	**Project (Number/Name)** MD69 / *Directed Energy Research*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
-- Demonstrate a compact, packaged FCL system --- Conduct first light of the compact, packaged FCL system --- Conduct a 30 kilowatt Low Size Weight and Power (SWaP) demonstration validating a 7 kilogram per kilowatt integrated FCL package -- Conduct preliminary and critical designs for a 50 kilowatt low SWaP 5 kilogram per kilowatt integrated FCL package			
Accomplishments/Planned Programs Subtotals	20.691	26.055	47.691

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
• 0603176C: *Advanced Concepts and Performance Assessment*	9.999	12.139	17.880	-	17.880	12.599	12.897	13.004	13.221	Continuing	Continuing
• 0603177C: *Discrimination Sensor Technology*	35.223	28.200	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• 0603179C: *Advanced C4ISR*	13.061	9.876	3.626	-	3.626	0.000	0.000	0.000	0.000	0	26.563
• 0603180C: *Advanced Research*	18.476	17.364	23.433	-	23.433	19.870	20.529	21.131	21.494	Continuing	Continuing
• 0603890C: *BMD Enabling Programs*	395.927	404.780	401.594	-	401.594	404.993	409.481	427.603	434.868	Continuing	Continuing
• 0604115C: *Technology Maturation Initiatives*	0.000	27.225	90.266	-	90.266	149.901	205.787	198.136	201.431	Continuing	Continuing

Remarks

D. Acquisition Strategy

The acquisition strategy for the MD69, Directed Energy Research, consists of partnering with Industry, the Defense Advanced Research Projects Agency, the Air Force, Federally Funded Research and Development Centers and University Affiliated Research Centers. MDA will leverage Agency and partner subject matter experts and use government model based assessments to inform Better Buying Power philosophy acquisition decisions. MDA will then award contracts to industry and universities via the Advanced Technology Innovation Broad Agency Announcement and competitive procurements to develop and demonstrate promising components and integrated systems in realistic test environments.

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2017 Missile Defense Agency			Date: February 2016
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603178C / *Weapons Technology*	Project (Number/Name) MD72 / *Interceptor Technology*	

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
MD72: *Interceptor Technology*	18.953	40.000	22.967	22.000	-	22.000	0.000	0.000	0.000	0.000	Continuing	Continuing

Note

N/A

A. Mission Description and Budget Item Justification

The Interceptor Technology project develops Divert and Attitude Control System (DACS) technology to enhance operational performance of future Multi-Object Kill Vehicle (MOKV). Technology investment will focus on DACS subsystem and system elements that support longer operation, multiple discrete events, precision attitude control, safe operation and minimum kill vehicle mass. In FY 2017, MDA will continue investment in a competitive next generation solid DACS development with industry to reduce propulsion component risk for the MOKV. The concept(s) being developed for MOKV application will transition to implementation with the industry MOKV developers. MDA will also continue to conduct component testing of lightweight, long duration Cooled Gas and Multi-Pulse Attitude Control Systems having application to both a Kill Vehicle and a Third Stage Rocket Motor, while anchoring system sizing and performance prediction models. MDA will define the baseline requirements using analytical tools to identify mature technology capable of supporting MOKV development.

The project will also model and assess electromagnetic rail gun projectile technology readiness, suitability, and integration requirements for ballistic missile defense applications.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
Title: Interceptor Technology	40.000	22.967	22.000
Description: Interceptor Technology focuses on development and test of component and sub-systems for solid propulsion Divert and Attitude Control Systems (DACS), including propellant tanks, Attitude Control System and divert thrusters, and pressurant subsystems. This project will also investigate electromagnetic rail gun suitability and integration requirements for ballistic missile defense applications. This is a continuation of systems engineering and analysis that began under the BMD Enabling Programs program element, 0603890C in FY 2014.			
FY 2015 Accomplishments: - Developed performance measures based on multi-object kill vehicle (MOKV) government concepts - Assessed solid DACS concepts - Identified solid DACS technology gaps for MOKV application and potential technology solutions - Invested with industry to develop gap filling technology solutions leading to a next generation initial DACS design for MOKV			

Exhibit R-2A, RDT&E Project Justification: PB 2017 Missile Defense Agency		Date: February 2016
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603178C / *Weapons Technology*	**Project (Number/Name)** MD72 / *Interceptor Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2015	FY 2016	FY 2017
- Conducted additional material and sub-component level tests (Valve, Thruster, Accumulator) to mature a multiple gas generator solid DACS) design for use in future Ballistic Missile Defense System (BMDS) interceptors			
FY 2016 Plans: - In FY 2016, $12.967 million is for advanced technology efforts in interceptor technology to address an emerging threat.			
- Deliver initial design of a next generation solid DACS technology concept(s) that support multiple object kill vehicle development			
- Conduct initial government review and assessment of contractor(s) concepts to determine utility of alternative technology			
- Initiate component development testing to support government assessment and finalize concept design			
- Conduct government review and update assessment of contractor's final concept(s) to identify remaining gaps			
- Investigate preliminary rail gun projectile technology suitability for ballistic missile defense applications			
FY 2017 Plans: - Conduct DACS technology development and testing to further reduce propulsion component risk for industry MOKV concept development			
- Conduct component testing of lightweight, long duration Cooled Gas Attitude Control System			
- Investigate rail gun projectile technology suitability for ballistic missile defense applications			
Accomplishments/Planned Programs Subtotals	40.000	22.967	22.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
• 0603176C: *Advanced Concepts and Performance Assessment*	9.999	12.139	17.880	-	17.880	12.599	12.897	13.004	13.221	Continuing	Continuing
• 0603177C: *Discrimination Sensor Technology*	35.223	28.200	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
• 0603179C: *Advanced C4ISR*	13.061	9.876	3.626	-	3.626	0.000	0.000	0.000	0.000	0	26.563
• 0603180C: *Advanced Research*	18.476	17.364	23.433	-	23.433	19.870	20.529	21.131	21.494	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2017 Missile Defense Agency		Date: February 2016
Appropriation/Budget Activity 0400 / 3	**R-1 Program Element (Number/Name)** PE 0603178C / *Weapons Technology*	**Project (Number/Name)** MD72 / *Interceptor Technology*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
• 0603890C: *BMD Enabling Programs*	395.927	404.780	401.594	-	401.594	404.993	409.481	427.603	434.868	Continuing	Continuing
• 0603892C: *AEGIS BMD*	761.646	830.647	959.066	-	959.066	841.738	700.596	592.940	528.744	Continuing	Continuing
• 0603904C: *Missile Defense Integration and Operations Center (MDIOC)*	53.972	47.939	54.750	-	54.750	53.894	55.524	58.100	59.029	Continuing	Continuing

Remarks

D. Acquisition Strategy

This effort leverages Agency and partner subject matter experts and government model based assessments to inform Better Buying Power philosophy acquisition decisions. Through a competition with industry contractors, MDA will develop a next generation Divert Attitude Control System based on future multi-object kill vehicle architecture and interfaces.

E. Performance Metrics

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2017 Missile Defense Agency			Date: February 2016
Appropriation/Budget Activity 0400 / 3	R-1 Program Element (Number/Name) PE 0603178C / *Weapons Technology*	Project (Number/Name) MD40 / *Program-Wide Support*	

COST ($ in Millions)	Prior Years	FY 2015	FY 2016	FY 2017 Base	FY 2017 OCO	FY 2017 Total	FY 2018	FY 2019	FY 2020	FY 2021	Cost To Complete	Total Cost
MD40: *Program-Wide Support*	-	0.705	2.131	2.152	-	2.152	3.309	2.701	3.374	3.522	Continuing	Continuing

A. Mission Description and Budget Item Justification

PWS contains non-headquarters management costs in support of MDA functions and activities across the entire BMDS. It Includes Government Civilians, and Contract Support Services. This provides integrity and oversight of the BMDS as well as supports MDA in the development and evaluation of technologies that will respond to the changing threat. Additionally, PWS includes Global Deployment personnel and support performing deployment site preparation and activation and, provides facility capabilities for MDA Executing Agent locations. Other MDA wide costs includes: physical and technical security; civilian drug testing; audit readiness; the Science, Technology, Engineering, and Mathematics (STEM) program; legal services and settlements; travel and agency training; office, equipment, vehicle, and warehouse leases; utilities and base operations; data and unified communications support; supplies and maintenance; materiel and readiness and central property management of equipment; and similar operating expenses. PWS is allocated on a pro-rata basis and therefore, fluctuates by year based on the adjusted RDT&E profile (which excludes: 0305103C Cyber Security Initiative, 0603274C Special Programs, 0603913C Israeli Cooperative Program and 0901598C Management Headquarters).